

TEST REPORT

No. AE18-0021802-03

IMMUNITY TESTS

performed in accordance with

☒ EN 55024:2010 + A1:2015

PRODUCT	USB power supply
MODEL TESTED	USB 2.4 A
TRADE MARK	4 BOX
APPLICANT	4 BOX S.r.l. – V.le Pasubio 6A – I-20154 Milano

Tested by	Renato Foschi <i>[Laboratory Technician]</i>	
Approved by	Giovanni Di Turi <i>[Laboratory manager]</i>	

Revision Sheet

Release No.	Date	Revision Description
Rev. 0	2018-03-14	First edition Digital signed_AE18-0021802-03_TR_EN 55024 2010 A1 2015_4 BOX_USB PS_USB 2.4 A

The results of tests and checks reported in this Test Report refer exclusively to the samples tested and described in the Report itself.
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1. GENERAL DATA

SAMPLE		
Samples received on	2018/01/22	(Item(s) sampled and sent by applicant)
IMQ reference samples	BEM	89387
Samples tested No.	1	
Object under analysis recognition	Not carried out	
Remark:	Except where stated, characteristics of products were taken from client description and were not verified by the laboratory	
TEST LOCATION		
Testing dates	2018-02-19	
Testing laboratory	IMQ S.p.A. - Via Quintiliano, 43 – I-20138 Milano	
Testing site	Viale Lombardia, 20 – I-20021 Bollate (MI)	
ENVIRONMENTAL CONDITIONS		
Parameter	Range	
Ambient Temperature	20 ÷ 25 °C	
Relative Humidity	50 ÷ 60 %	
Atmospheric Pressure	900 ÷ 1000 mbar	
The laboratory is monitored by a continuous environmental conditions measurements system. Temperature, humidity and pressure data are recorded on a weekly basis and stored in local archive.		
REMARKS		
Throughout this report a point (comma) is used as the decimal separator. The ability or reliability of this product to perform its intended function in a particular application has not been investigated. Unless otherwise specified, warnings, installation instruction and/or user manual provided with the sample have been checked in Italian or English version only. IMQ declines any responsibility derived from missing or wrong information provided aside by the applicant.		

2. REFERENCE DOCUMENTS

The generic standard:

<input checked="" type="checkbox"/>	EN 55024 A1	2010 2015	Information technology equipment - Immunity characteristics - Limits and methods of measurement
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makes reference to the following Basic Standards:

DOCUMENT	DATE	TITLE
<input checked="" type="checkbox"/> IEC 61000-4-2	2008 ^(*)	Electromagnetic compatibility (EMC) Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test
<input checked="" type="checkbox"/> IEC 61000-4-3 A1 A2	2006 ^(*) 2007 ^(*) 2010 ^(*)	Electromagnetic compatibility (EMC) Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test
<input checked="" type="checkbox"/> IEC 61000-4-4	2004 ^(*)	Electromagnetic compatibility (EMC) Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test
<input checked="" type="checkbox"/> IEC 61000-4-5	2005 ^(*)	Electromagnetic Compatibility (EMC) Part 4-5: Testing and measurement techniques Surge immunity test
<input checked="" type="checkbox"/> IEC 61000-4-6	2008 ^(*)	Electromagnetic Compatibility (EMC) Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields
<input checked="" type="checkbox"/> IEC 61000-4-8	2009 ^(*)	Electromagnetic compatibility (EMC) - Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test
<input checked="" type="checkbox"/> IEC 61000-4-11	2004 ^(*)	Electromagnetic compatibility (EMC) Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests

According to Annex ZA of generic standard the signed standards, with ^(*), are dated. For other referenced standard is applied the latest edition (including any amendments).

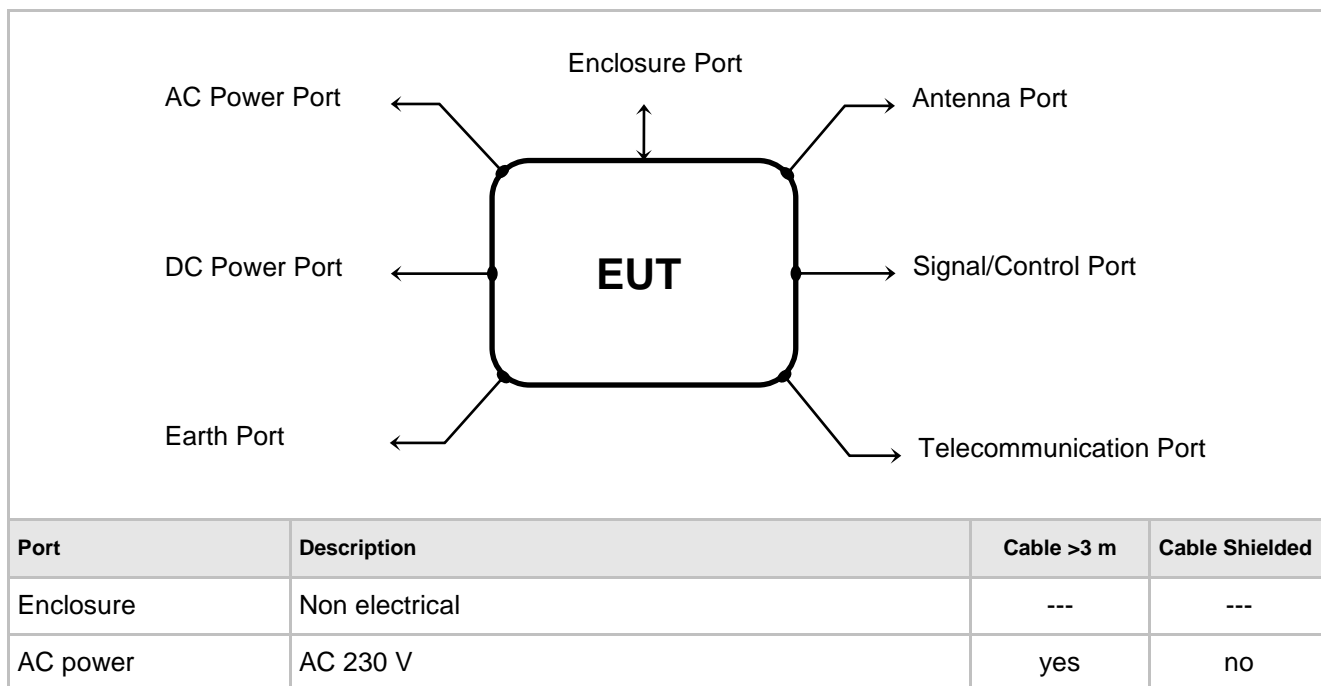
3. EQUIPMENT UNDER TEST (EUT) DETAILS

MODEL (basic)	Description
USB 2.4 A	USB power supply
MANUFACTURER	4 BOX S.r.l. – V.le Pasubio 6A – I-20154 Milano
ASSEMBLY PLANT	

EUT IDENTIFICATION

EUT type	USB power supply		
EUT classification	Multimedia equipment		
EUT use	<input checked="" type="checkbox"/> Fixed	<input type="checkbox"/> Vehicular	<input type="checkbox"/> Portable
EUT single or system	<input checked="" type="checkbox"/> Single	<input type="checkbox"/> System	
EUT standing	Wall		
Supply voltage	AC 230 V		
Frequency	50 Hz		
Power	---		
Ambient rating	---		

EUT PORTS



MODE OF OPERATION DURING THE TESTS

Ref.	Mode	Description
#1	Normal operation	USB active. Resistive load connected

SUPPORT EQUIPMENT

Defined as equipment needed for correct operation or loading of the EUT, but not considered as tested:

Equipment	Manufacturer	Model
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ELECTROMAGNETICALLY RELEVANT COMPONENTS

Component	No.	Manufacturer	Model
Electronic board	1	---	---

RFI SUPPRESSION DEVICES

Component	No.	Manufacturer	Model
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EMI PROTECTION DEVICES

Component	No.	Manufacturer	Model
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EUT TECHNICAL DOCUMENTATION

Document	Reference
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4. PERFORMANCE CRITERIA

Performance criterion A:

The equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

Performance criterion B:

After the test, the equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is allowed. However, no change of operating state or stored data is allowed to persist after the test. If the minimum performance level (or the permissible performance loss) is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

Performance criterion C:

Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

EUT PERFORMANCE ASSESSMENT

As declared by manufacturer:

Primary function	USB power supply
Representative parameter	Constant output current
Acceptable level of performance	The apparatus shall continue to operate as intended

5. SUMMARY OF TEST RESULTS

POSSIBLE TEST CASE VERDICTS:	
Test object meets the requirement	PASS
Test object does not meet the requirement	FAIL
Test case does not apply to the test object	N.A.
Test not performed	N.P.

PORT	ENVIRONMENTAL PHENOMENON	RESULT
Enclosure	Power frequency magnetic field, 50 Hz	PASS
	Radio frequency electromagnetic fields, 80 MHz to 1000 MHz	PASS
	Electrostatic discharge	PASS
Signal ports	Radio-frequency common mode	N.A.
	Electrical fast transients/bursts	N.A.
	Surges	N.A.
D.C. ports (USB)	Radio-frequency common mode	PASS
	Electrical fast transients/bursts	PASS
	Surges	PASS
A.C. mains	Radio-frequency common mode	PASS
	Voltage dips and interruptions	PASS
	Surges	PASS
	Electrical fast transients/bursts	PASS

6. RESULTS DETAILS: IMMUNITY TESTS

6.1 ELECTROSTATIC DISCHARGE IMMUNITY TEST

TEST REQUIREMENT	
Reference standard	IEC 61000-4-2
Test set-up details	§ 7
Test specification	None
IMQ operational instruction	IO-80-P03
Test procedure	IEC 61000-4-2 § 8
Deviation to test procedure	None
EUT operating condition	#1
Testing dates	2018-02-19

Position	Test voltage (kV)	Polarity		Number of applications	Pulse per second	Performance criteria	Results
		+	-				
Indirect discharge points							
Enclosure	8 / 4 / 2	x	x	10	1	B	PASS
Coupling planes	6 / 4 / 2	x	x	10	1	B	PASS
Contact discharge points							
Enclosure	8 / 4 / 2	x	x	10	1	B	PASS
Coupling planes	6 / 4 / 2	x	x	10	1	B	PASS
Air discharge points							
Enclosure	8 / 4 / 2	x	x	10	1	B	PASS
Coupling planes	6 / 4 / 2	x	x	10	1	B	PASS

REMARKS

The tested sample results compliance with the performance criteria and continues to operate as intended during and after the test.

6.2 RADIATED RADIOFREQUENCY ELECTROMAGNETIC FIELD IMMUNITY TEST

TEST REQUIREMENT	
Reference standard	IEC 61000-4-3
Test set-up	§ 7
Test specification	None
IMQ operational instruction	IO-80-P21 + IO-80-P22
Test procedure	IEC 61000-4-3 § 8
Deviation to test procedure	None
EUT operating condition	#1
Testing dates	2018/02/19

Frequency (MHz)	Test field strength (V/m (rms)) (unmodulated)	Modulation during the test	Performance criteria	Results
80 ÷ 1000	3	AM, 80 %, 1 kHz sinewave	A	PASS

Frequency step: 1%
Actuation time: 3 seconds

REMARKS
The tested sample results compliance with the performance criteria and continues to operate as intended during and after the test.

6.3 ELECTRICAL FAST TRANSIENT / BURST IMMUNITY TEST

TEST REQUIREMENT	
Reference standard	IEC 61000-4-4
Test set-up	§ 7
Test specification	None
IMQ operational instruction	IO-80-P26 + IO-80-P30
Test procedure	IEC 61000-4-4 § 8
Deviation to test procedure	None
EUT operating condition	#1
Testing dates	2018-02-19

Port under test	Test voltage (kV)	Duration test	Coupling mode	Polarity		Performance criteria	Results
				+	-		
USB	0.5	2 min	<input checked="" type="checkbox"/> CDN			B	PASS
			<input type="checkbox"/> Capacitive Clamp			B	PASS
AC mains	1	2 min	<input checked="" type="checkbox"/> CDN			B	PASS
			<input type="checkbox"/> Capacitive Clamp			B	PASS

REMARKS

The tested sample results compliance with the performance criteria and continues to operate as intended during and after the test.

6.4 SURGE IMMUNITY TEST

TEST REQUIREMENT	
Reference standard	IEC 61000-4-5
Test set-up	§ 7
Test specification	None
IMQ operational instruction	IO-80-P28 + IO-80-P30
Test procedure	IEC 61000-4-5 § 8
Deviation to test procedure	None
EUT operating condition	#1
Testing dates	2018-02-19

Port under test	Mode	Test voltage (kV)	Repetition rate	Phase angle	Polarity		Perf. criteria	Results
					+	-		
USB (shield)	<input checked="" type="checkbox"/> Common	0.5	1 per minute	Random	x	x	B	PASS
AC mains	<input checked="" type="checkbox"/> Common	2	1 per minute	0°; 90°; 180°; 270°	x	x	B	PASS
	<input checked="" type="checkbox"/> Differential	1	1 per minute	0°; 90°; 180°; 270°	x	x	B	PASS

REMARKS

The tested sample results compliance with the performance criteria and continues to operate as intended during and after the test.

6.5 IMMUNITY TO CONDUCTED DISTURBANCES, INDUCED BY RADIO-FREQUENCY FIELDS

TEST REQUIREMENT	
Reference standard	IEC 61000-4-6
Test set-up	§ 7
Test specification	None
IMQ operational instruction	IO-80-P24 + IO-80-P25
Test procedure	IEC 61000-4-6 § 8
Deviation to test procedure	None
EUT operating condition	#1
Testing dates	2018-02-19

Port under test	Test voltage (V(rms)) (unmodulated)	Modulation during the test	Coupling mode	Performance criteria	Results
USB	3	AM, 80 %, 1 kHz sinewave	<input checked="" type="checkbox"/> CDN <input type="checkbox"/> Inductive clamp	A	PASS
AC mains	3	AM, 80 %, 1 kHz sinewave	<input checked="" type="checkbox"/> CDN <input type="checkbox"/> Inductive clamp	A	PASS

Frequency step: 1%
Actuation time: 3 seconds

REMARKS

The tested sample results compliance with the performance criteria and continues to operate as intended during and after the test.

6.6 POWER FREQUENCY MAGNETIC FIELD IMMUNITY TEST

TEST REQUIREMENT	
Reference standard	IEC 61000-4-8
Test set-up	§ 7
Test specification	None
IMQ operational instruction	IO-80-P31
Test procedure	IEC 61000-4-8 § 8
Deviation to test procedure	None
EUT operating condition	#1
Testing dates	2018-02-19

Frequency (Hz)	Test magnetic field (A/m (rms))	Performance criteria	Results
50	3	A	PASS

REMARKS

The tested sample results compliance with the performance criteria and continues to operate as intended during and after the test.

6.7 VOLTAGE DIPS, SHORT INTERRUPTIONS AND VOLTAGE VARIATIONS IMMUNITY TESTS

6.7.1 VOLTAGE DIPS TEST

TEST REQUIREMENT	
Reference standard	IEC 61000-4-11
Test set-up	§ 7
Test specification	None
IMQ operational instruction	IO-80-P27
Test procedure	IEC 61000-4-11 § 8
Deviation to test procedure	None
EUT operating condition	#1
Testing dates	2018-02-19

Port	Duration (periods)	Test level in % of rated voltage	Repetition rate	Number of applications	Performance criteria	Results
AC mains	0.5	0	1 per 20 sec	3	B	PASS
	25	30	1 per 20 sec	3	C	PASS

REMARKS

The tested sample results compliance with the performance criteria and continues to operate as intended during and after the test.

6.7.2 SHORT INTERRUPTIONS AND VOLTAGE VARIATIONS IMMUNITY TESTS

Port	Duration (periods)	Test level in % of rated voltage	Repetition rate	Number of applications	Performance criteria	Results
AC mains	250	0	1 per 20 sec	3	C	PASS

REMARKS

The tested sample results compliance with the performance criteria and continues to operate as intended during and after the test.

7. TESTS UNCERTAINTY

Unless otherwise stated the uncertainties for the tests and measurements are evaluated in according to IMQ Operational Instruction IO-LAB-001 and IO-LAB-004.

The expanded uncertainty was calculated for all measurements and tests listed in this test report according to CISPR 16-4-2 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4-2: Uncertainty in EMC Measurements", with UKAS document LAB 34 and is documented in the quality system accordance to ISO/IEC 17025.

Internal Procedure PG-037 ensures that the requirements for traceability of calibrations, of all test equipment requiring calibration, and calibration intervals are met.

8. MEASUREMENT EQUIPMENT AND INSTRUMENTATION

ELECTROSTATIC DISCHARGE IMMUNITY TEST			
Instrument	Manufacturer	Model	IMQ Ref.
ESD Generator	EM TEST	ESD 30C	S-03475

RADIATED RADIOFREQUENCY ELECTROMAGNETIC FIELD IMMUNITY TEST			
Instrument	Manufacturer	Model	IMQ Ref.
Shielded anechoic chamber	SIDT	/	P-02386
RF generator	ROHDE & SCHWARZ	SMT03	S-02388
Log antenna	ARA	LPB-2513	S-02385
Horn antenna	SCHWARZBECK	BBHA 9120D	S-03463
RF amplifier	AMPLIFIER RESEARCH	100W1000M1A	S-02389
RF amplifier	AMPLIFIER RESEARCH	60S1G3	S-04261
Directional coupler	AMPLIFIER RESEARCH	DC6180	S-03509
Directional coupler	AMPLIFIER RESEARCH	DC7144A	S-04182
Power sensor	ROHDE & SCHWARZ	NRP-Z91	S-04706
Power sensor	ROHDE & SCHWARZ	NRP-Z91	S-04707
Software	ROHDE & SCHWARZ	EMC 32 Vers. 8.30	W-00124-K1
PC	/	/	H-00098

ELECTRICAL FAST TRANSIENT / BURST IMMUNITY TEST SURGES, LINE TO LINE AND LINE TO GROUND			
Instrument	Manufacturer	Model	IMQ Ref.
Burst e surge generator	EM TEST	UCS 500 M6BS1	S-04526
Capacitive clamp	EM TEST	HFK	S-04527
Software	EM TEST	ISMIEC Vers. 4.08	W-00085
PC	/	/	H-00081

IMMUNITY TO CONDUCTED DISTURBANCES, INDUCED BY RADIO-FREQUENCY FIELDS

Instrument	Manufacturer	Model	IMQ Ref.
RF generator	ROHDE & SCHWARZ	SMG	S-00562
RF amplifier	AMPLIFIER RESEARCH	25A250A	S-03499
6 dB attenuator	PASTERNAK	PE 7021-6	S-05596
CDN	MEB	M3	S-03507
Inductive clamp	FCC - FISCHER CUSTOM	FCC-2031	S-03500
Software	TESEO	XCS Vers. 3.2.2	W-00003
PC	/	/	H-00167

POWER FREQUENCY MAGNETIC FIELD

Instrument	Manufacturer	Model	IMQ Ref.
Variable voltage generator	SUSTA	/	P-00385
Square loop for magnetic field generation (5 coils)	/	1 meter	S-06436
Resistor (X2)	/	2 x 1.12 Ω	/

VOLTAGE DIPS, SHORT INTERRUPTIONS AND VOLTAGE VARIATIONS MAINS SUPPLY VOLTAGE VARIATIONS

Instrument	Manufacturer	Model	IMQ Ref.
EMC test system	SPITZENBERGER	EMV E 5000/PAS	P-02355
Generator	SPITZENBERGER	SYCORE 2.3	S-03570
Amplifier	SPITZENBERGER	PAS 5000	S-03571
Line impedance simulator	SPITZENBERGER	/	S-03572
Software 1	SPITZENBERGER & SPIES	EMC TEST Vers. 1.72	W-00200
PC	/	/	H-00166

9. PHOTOGRAPHIC DOCUMENTATION

EUT IDENTIFICATION



10. OPINIONS AND INTERPRETATIONS - NOT OBJECT TO ACCREDIA ACCREDITATION

Not Applicable

END OF TEST REPORT